National Marine Fisheries Service Endangered Species Act (ESA) Section 7 Consultation Biological Opinion and Magnuson–Stevens Act Essential Fish Habitat Consultation

Action Agency:	The Bureau of Indian Affairs (BIA)
Species/ESUs Affected:	Upper Columbia River (UCR) steelhead (*Oncorhynchus mykiss*) Upper Columbia River (UCR) spring chinook (*Oncorhynchus tshawytscha*)
Activities Considered:	Conduct yearly Chief Joseph Dam tailrace fishery from 2002 through 2012, as described in fishery management plan proposed by the BIA on behalf of the Colville Confederated Tribes.
Consultation Conducted by:	The Sustainable Fisheries Division (SFD), Northwest Region NOAA Fisheries Consultation Number: F/NWR/2001/01479

This Biological Opinion (Opinion) constitutes NOAA Fisheries' review of an 11-year fishery management plan submitted by the Bureau of Indian Affairs (BIA) on behalf of the Confederated Tribes of the Colville Indian Reservation (CCT). This Opinion has been prepared in accordance with section 7 of the Endangered Species Act (ESA), as amended (16 U.S.C. 1531 et seq.). It is based on information provided in the fishery management plan and biological assessment submitted by the BIA on behalf of the CCT, published and unpublished scientific information on the biology and ecology of threatened salmon and steelhead in the action area, and other sources of information. A complete administrative record of this consultation is on file with Sustainable Fisheries Division in Seattle, Washington.

Approved by: Joe Scordino
for D. Robert Lohn, Regional Administrator

Date: 12/19/02
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CONSULTATION HISTORY

On June 20, 2001, the BIA submitted a biological assessment and proposed fishery management plan for the CCT Chief Joseph Dam tailrace fishery (Nicholson 2001). The BIA submitted the plan as the representative of the CCT based on the Federal government's trust responsibilities and the authority of the BIA to impose conservation measures over tribal actions affecting fisheries resources (Nicholson 2001). On June 29, 2001, NOAA Fisheries completed a preliminary evaluation of the biological assessment and issued a letter under section 7(d) of the ESA which concluded that implementation of the aforementioned fisheries prior to the expected completion of the biological opinion in 2001 did not make any irreversible or irretrievable commitment of resources with respect to the agency action (BIA) which would have the effect of foreclosing the formulation or implementation of any reasonable and prudent alternatives which would not violate subsection 7(a)(2) (Darm 2001). NOAA Fisheries was unable to complete the formal consultation before September 2001. The CCT stopped the fishery after September 11, 2001, because of security concerns related to access to Chief Joseph Dam.

On April 11, 2002, the BIA submitted a new biological assessment and fishery management plan on behalf of the CCT for the Chief Joseph Dam fishery for the years 2002 through 2012 (Nicholson 2002a). NOAA Fisheries responded with a number of comments and on May 21, 2002, and July 2, 2002, the BIA submitted revised assessments (Nicholson 2002b and 2002c). Once again, NOAA Fisheries was unable to complete the section 7 consultation before CCT intended to open the fisheries in 2002. Therefore, NOAA Fisheries issued another letter pursuant to section 7(d) of the ESA to ensure that the BIA did not make irreversible or irretrievable commitment of resources which has the effect of foreclosing the formulation or implementation of any reasonable and prudent alternatives which would not violate subsection 7(a)(2) (Robinson 2002).

BIOLOGICAL OPINION

1.0 DESCRIPTION OF THE PROPOSED ACTION

1.1 Proposed Action

The CCT proposes to conduct a tail race snag fishery targeting adult salmon of the unlisted UCR summer/fall chinook salmon Evolutionarily Significant Unit (ESU). The CCT prepared a long-term fishery management plan that consists of the following elements:

1. The proposed fishery begins July 1 and closes October 31 of each calendar year, or sooner if incidental take thresholds for UCR steelhead are reached before the end of October.
2. Creel census data will be collected over an eight-hour survey period, 22 days per month for the duration of the fishery each year, from 2002 trough 2012.

3. The fishery uses hook-and-line gear, with approximately 70% of the fishers using snag techniques.
4. The CCT will maintain a current daily in-season accounting of incidental take, including harvested fish and fish hooked but not landed, each year from 2002 to 2012. The incidental take of listed fish will include a 50% mortality rate for fish hooked but not landed.
5. The number of UCR spring chinook salmon and UCR steelhead hooked but not landed will be assumed from the respective proportion in the landed catch.
6. The expected incidental harvest rate for UCR spring chinook during this plan is between 0% and 0.1% of the run over Wells Dam.
7. The abundance-based incidental harvest rate schedule for UCR steelhead in the fishery management plan are described in Table 5.
8. The CCT will use inseason runsize estimates provided by the Washington Department of Fish and Wildlife to calculate the allowable incidental take of UCR steelhead as a proportion of the inseason runsize, using the harvest rate schedule in Table 5.
9. At anytime during October, if the catch composition exceeds 50 percent steelhead on any given day, or 40 percent steelhead on a 3-day rolling average, the Tribes will immediately close the fishery for the remainder of the season.

1.2 Action Area

The action area for the proposed fishery action is the 12-mile section of the Columbia River in the State of Washington, downstream from Chief Joseph Dam (river mile 545) to the confluence of the Okanogan River (river mile 533). (Nicholson 2002 a,b,c). The fishing activities will likely occur in a small area, about ½ mile from the base of the dam. Chief Joseph Dam is an impassable barrier blocking upstream migration for chinook salmon and steelhead.

2.0 STATUS OF SPECIES UNDER THE ENVIRONMENTAL BASELINE

In order to describe a species' status, it is first necessary to define precisely what "species" means in this context. Traditionally, one thinks of the ESA listing process as pertaining to entire taxonomic species of animals or plants. While this is generally true, the ESA also recognizes that there are times when the listing unit must necessarily be a subset of the species as a whole. In these instances, the ESA allows a "distinct population segment" (DPS) of a species to be listed as threatened or endangered. UCR spring chinook salmon and UCR steelhead are just such a DPS and, as such, are for all intents and purposes considered two "species" under the ESA.

NOAA Fisheries developed the approach for defining salmonid DPSs in 1991 (Waples 1991). It states that a population or group of populations is considered distinct if they are "substantially reproductively isolated from conspecific populations," and if they are considered "an important component of the evolutionary legacy of the species." A distinct population or group populations is referred to as an evolutionarily significant unit (ESU) of the species. Hence, UCR spring chinook salmon constitute an ESU of the species *O. tshawytscha*, and UCR steelhead an ESU of the species *O. mykiss*.

The UCR spring chinook salmon ESU, listed as endangered on March 24, 1999 (64 FR 14308), includes all natural-origin, stream-type chinook salmon from river reaches above Rock Island Dam and downstream of Chief Joseph Dam, including the Wenatchee, Entiat, and Methow River basins. All chinook in the Okanogan River are apparently ocean-type and are considered part of the UCR summer- and fall-run ESU. The spring-run components of the following hatchery stocks are also listed: Chiwawa, Methow, Twisp, Chewuch, and White Rivers and Nason Creek.

The UCR steelhead ESU, listed as endangered on August 18, 1997 (62 FR 43937), includes all natural-origin populations of steelhead in the Columbia River Basin upstream from the Yakima River, Washington, to the U.S./Canada border. The Wells Hatchery stock is included among the listed populations.

NOAA Fisheries designated critical habitat for UCR spring-run chinook salmon on December 28, 1993 (58 FR 68543), and for UCR steelhead on February 16, 2000 (65 FR 7764). On April 30, 2002, critical habitat for these two ESUs was vacated by court order and remanded to NOAA Fisheries for new rulemaking. In the absence of a new rule designating critical habitat for UCR spring chinook salmon and UCR steelhead, this consultation will evaluate the effects of the proposed action on the listed species habitat to determine whether those actions are likely to jeopardize the species' continued existence.

2.1 Species/ESUs Life History

2.1.1 UCR Spring Chinook

The Upper Columbia River spring chinook salmon ESU includes all natural-origin stream-type chinook salmon from river reaches above Rock Island Dam and downstream of Chief Joseph Dam, including the Wenatchee, Entiat, and Methow River basins (Myers *et al.* 1998). All chinook in the Okanogan River are apparently ocean-type and are considered part of the Upper Columbia River Summer/Fall run ESU. WDF *et al.* (1993) identified nine stocks within this ESU. All stocks, with the exception of the Methow stock, were considered by WDF *et al.* (1993) to be of native origin, of *wild* production type, and as *depressed* in status. The Washington Department of Fish and Wildlife (WDFW) considers the Methow spring chinook stock to be a *composite* in production type, but of native origin, and depressed in status.

Based upon the population status of the species and risk factors affecting the likelihood for its continued existence, NOAA Fisheries has proposed that the ESU warrants protection under the ESA as endangered. When listing the UCR spring chinook salmon as endangered NOAA Fisheries included six hatchery populations as part of the ESU: Chewuch River, Methow River, Twisp River, Chiwawa River, White River and Nason Creek. These six hatchery populations were considered to be essential for recovery and were therefore listed as part of the ESU. Hatchery populations at Winthrop NFH, Entiat NFH and Leavenworth NFH were not included as part of the ESU because they were derived from Carson NFH spring chinook salmon.

Upper Columbia River spring chinook have a stream-type life history. Adults return to the Wenatchee River during late March through early May, and to the Entiat and Methow rivers during late March through June. Most adults return after spending 2 years in the ocean, although 20% to 40% return after 3 years at sea. Upper Columbia River spring chinook experience very little ocean harvest. Peak spawning for all three populations occurs from August to September. Smolts typically spend 1 year in freshwater before migrating downstream. There are slight genetic differences between this ESU and others containing stream-type fish, but more importantly, the ESU boundary was defined using ecological differences in spawning and rearing habitat (Myers *et al.* 1998). The Grand Coulee Fish Maintenance Project (1939 through 1943) may have had a major influence on this ESU because fish from multiple populations were mixed into one relatively homogenous group and redistributed into streams throughout the Upper Columbia River region.

2.1.2 UCR Steelhead

Biologically, steelhead can be divided into two basic run-types, based on the state of sexual maturity at the time of river entry and duration of spawning migration (Burgner *et al.* 1992). The stream-maturing type, or summer steelhead, enters fresh water in a sexually immature condition and requires several months in freshwater to mature and spawn. The ocean-maturing type, or winter steelhead, enters fresh water with well-developed gonads and spawns shortly after river entry (August 9, 1996, 61 FR 41542; Barnhart 1986). Variations in migration timing exist between populations. Some river basins have both summer and winter steelhead, while others only have one run-type. Only summer-run steelhead occur in the Upper Columbia River basin.

The Upper Columbia River steelhead ESU includes all natural-origin populations of steelhead in the Columbia River Basin upstream from the Yakima River, Washington, to the U.S./Canada border. The WDFW Wells Hatchery steelhead stock is considered essential for recovery, and is included in the listing.

Upper Columbia River steelhead inhabit the Columbia River reach and its tributaries upstream of the Yakima River. This region includes several rivers that drain the east slopes of the Cascades Mountains and several that originate in Canada (only U.S. populations are included in the ESU). Dry habitat conditions in this area are less conducive to steelhead survival than in many other parts of the Columbia River Basin (Mullan *et al.* 1992a). Although the life history of this ESU is similar to that of other inland steelhead, smolt ages are some of the oldest on the west coast (up to 7 years old), probably due to the ubiquitous cold water temperatures (Mullan *et al.* 1992b). Adults of this ESU spawn later than most downstream populations. Adults of the Methow River and Wenatchee River populations primarily return after 2 years of ocean residency. Steelhead from this ESU enter the lower Columbia between May and September with fish arriving at Wells Pool in early July. Fish enter the Wenatchee and Methow rivers in mid-July and peak between mid-September and October. During winter, adult steelhead generally return to the warmer Columbia River and re-enter the Methow to begin spawning in mid-March after the ice had thawed. Spawning continues through May and many fish seek out higher reaches in the tributaries. Fry emergence occurs that summer and juveniles rear for two to four years prior to spring downstream migration. Adult steelhead may be handled during broodstock collection activities.

2.2 Overview—Status of the Species/ESUs

To determine a species' status under extant conditions (usually termed "the environmental baseline"), it is necessary to ascertain the degree to which the species' biological requirements are being met at that time and in that action area. For the purposes of this consultation, UCR steelhead biological requirements are expressed in two ways: Population parameters such as fish numbers, distribution, and trends throughout the action area; and the condition of various essential habitat features such as water quality, stream substrates, and food availability. Clearly, these two types of information are interrelated. That is, the condition of a given habitat has a large impact on the number of fish it can support. Nonetheless, it is useful to separate the species' biological requirements into these parameters because doing so provides a more complete picture of all the factors affecting UCR spring chinook and UCR steelhead survival. Therefore, the discussion to follow will be divided into two parts: Species Distribution and Trends; and Factors Affecting the Environmental Baseline.

2.2.1 Species Distribution and Trends

In its review of population status or trends and the effects of the proposed action on the listed UCR spring chinook and UCR steelhead ESUs, NOAA Fisheries is using developing science from several areas including the Cumulative Risk Initiative (CRI), and the Viable Salmonid Populations (VSP) paper. Both of these are described briefly below to provide context prior to their application in the subsequent discussion on ESU status.

Cumulative Risk Initiative

To determine the conservation status of the listed ESUs in the Columbia River, NOAA Fisheries is relying increasingly on the evolving scientific analysis contained in the CRI, which is an ongoing effort of the Northwest Fisheries Science Center (NWFSC 2000; NMFS 2000). The CRI analysis was used extensively in the Federal Columbia River Power System (FCRPS) biological opinion and the Basin-Wide Recovery Strategy (referred to as the "All-H" paper throughout this biological opinion) to help resolve critical questions regarding the magnitude of required survival improvements and how those survival improvements may be allocated among the various H's including harvest (Federal Caucus 2000).

For both ESUs and individual index stocks, the CRI estimates average annual rate of population change or "lambda." Lambda, which incorporates year-to-year variability, is the best summary statistic of how rapidly a population is growing or shrinking. A lambda less than 1.0 means the population is declining; a lambda greater than 1.0 means the population is increasing.

The CRI models project risks of extinction *if all factors remain the same as they were during the base years of the analysis.* NOAA Fisheries recognizes that many actions have been taken to improve the survival of these ESUs in recent years, and also recognizes that the base period arguably represents a particularly bad time for ocean survival of most ESUs. In the All-H paper and the FCRPS biological opinion, NOAA Fisheries has taken into account the management improvements that have been made, as well as the potential benefits from improved ocean conditions of the past few years.

Estimates of median population growth rate, risk of extinction, and the likelihood of meeting recovery goals are based on population trends observed during a base period that varies between subbasin populations. Population trends are projected under the assumption that all conditions will stay the same into the future.

Viable Salmonid Population

Another approach to assessing the status of an ESU and its component populations that is being developed by NOAA Fisheries is described in a paper related to Viable Salmonid Populations (McElhany *et al.* 2000). This paper provides guidance for determining the conservation status of populations and ESUs that can be used in ESA-related processes. In this opinion, we rely on VSP guidance in describing the population or stock structure of UCR spring chinook and UCR steelhead ESUs and the related effects of the action.

The task of identifying populations within an ESU requires making judgments based on the available information. Information regarding the geography, ecology, and genetics of the ESU are relevant to this determination. This is a task that will generally be taken up as part of the recovery planning process. Recovery planning is just now getting underway in the Columbia River Basin. NOAA Fisheries has provided interim guidance regarding geographic spawning aggregations UCR steelhead (Lohn 2002). It is appropriate in this opinion to consider the potential diversity of each ESU and the status of the component stocks to the degree possible.

The VSP paper also provides guidance regarding parameters that can be used for evaluating population status including abundance, productivity, spatial structure, and diversity. In this opinion, we consider particularly the guidance related to abundance. The paper provides several rules of thumb that are intended to serve as guidelines for setting population specific thresholds (McElhany *et al*. 2000). The guidance relates to defining both "viable" population levels and "critical" abundance levels. Although there are still no specific recommendations regarding threshold abundance levels for the affected ESUs, the concepts are developed in the opinion to the degree possible for evaluating population status and the related effect of the action. NOAA

Fisheries has recently provided interim abundance targets for ESUs in the Interior Columbia Basin (Lohn 2002) and these are considered where appropriate.

2.2.1.1 UCR Spring Chinook

Information on the status and distribution of UCR spring chinook salmon is found in the status review prepared by the Northwest Fisheries Science Center (NWFSC), NOAA Fisheries (Myers *et al*. 1998). More recent information on the status and distribution of the chinook salmon ESU, including hatchery components of the respective populations, is provided in the status review update prepared by the West Coast Chinook Salmon Biological Review Team (NMFS 1998) and the Evaluation of the Status of Chinook and Chum Salmon and Steelhead Hatchery Populations for ESUs Identified in Final Listing Determinations prepared by the Conservation Biology Division of the NWFSC (NMFS 1999a). The All Species Review (ASR) prepared by the *U.S. v Oregon* Technical Advisory Committee focused on the status of Columbia River Basin salmonids (TAC 1997).

NOAA Fisheries recently proposed Interim Recovery Abundance Levels and Cautionary Levels (Ford *et al*. 2001). *Cautionary Levels* were characterized as abundance levels that the population fell below only about 10% of the time during a historical period when it was considered to be relatively healthy. The three independent populations of spring chinook salmon identified for the ESU include those that spawn in the Wenatchee, Entiat, and Methow basins (Ford *et al.* 2001). The number of natural-origin fish returning to each sub-basin is shown in Table1. Escapements for UCR spring chinook salmon have been substantially below the *Cautionary Levels* in recent years, especially in 1995, indicating increasing risk to and uncertainty about the population's future status. However, in 2001 and 2002 (preliminary), escapements for UCR spring chinook salmon were well above *Cautionary Levels* and either above or close to the *Recovery Abundance Levels* (Table 1).

For the Upper Columbia River spring chinook salmon ESU (Table 2), NOAA Fisheries estimates that the average annual population growth rate (lambda) for the Methow River population ranges from 0.868 to 0.842, for the Entiat River population from 0.871 to 0.801, and for the Wenatchee River population from 0.806 to 0.794, with the estimate decreasing as the assumed effectiveness of hatchery fish spawning in the wild increases compared to that of fish of natural origin (Appendix B in McClure *et al.* 2000b). The NOAA Fisheries has also estimated the risk of absolute extinction (CRI estimates) for these same populations, using the same range of assumptions about the relative effectiveness of hatchery fish. At the low end, assuming that hatchery fish spawning in the wild have not reproduced (i.e., hatchery effectiveness = 0), and therefore that all fish used in the calculation represent successful natural production, the risk of absolute extinction within 100 years for the Methow, Entiat and Wenatchee Rivers are 0.97, 1.00 and 1.00, respectively. Assuming that the hatchery fish spawning in the wild have been as productive as wild-origin fish (hatchery effectiveness = 100%), and therefore that natural populations have been less productive than observed numbers of adults would indicate, the risk of absolute extinction within 100 years is 1.00 for all three populations. Without substantive improvements in conditions at a variety of life-cycle stages, this ESU is not replacing itself and remains at material risk of extinction. This analysis was last updated in September 2000 and therefore does not include the higher returns observed in 2000 and 2001 or the expected return in 2002.

Table 1. Estimates of the Number of Natural-Origin Fish Returning to Sub-basin for Each Independent Population of Upper Columbia River Spring Chinook Salmon and Preliminary Interim Recovery Abundance and Cautionary Levels

Year	Wenatchee River	Entiat River	Methow River
1979	1,154	241	554
1980	1,752	337	443
1981	1,740	302	408
1982	1,984	343	453
1983	3,610	296	747
1984	2,550	205	890
1985	4,939	297	1,035
1986	2,908	256	778
1987	2,003	120	1,497
1988	1,832	156	1,455
1989	1,503	54	1,217
1990	1,043	223	1,194
1991	604	62	586
1992	1,206	88	1,719
1993	1,127	265	1,496
1994	308	74	331
1995	50	6	33
1996	201	28	126
1997	422	69	247
1998	218	52	125
1999	119	64	73
2000	805	175	807
2001 [1]	4,315	485	9,692
2002[1]	*2,620*	*264*	*2,742*
Recovery Abundance	**3,750**	**500**	**2,000**
Cautionary Abundance	**1,200**	**150**	**750**

1/ Estimates for 2001and 2002 are preliminary.

Table 2. Annual rate of population change (λ), and risk of extinction (1 fish/generation) and risk of 90% decline in 24 and 100 years. The range of reported values assumes that natural spawning hatchery-origin fish either do not contribute to natural production or are as productive as natural-origin spawners. This analysis assumes that all factors remain the same as they were during the base years analyzed - generally 1980-1994.

	λ	Risk of extinction		Probability of 90% decrease in stock abundance	
		24 yrs	100 yrs	24 yrs	100 yrs
UCR spring chinook salmon [1]					
Methow	0.868 - 0.842	0.02 - 0.25	0.97 - 1.00	0.67 -0.79	0.99 - 1.00
Entiat	0.871 - 0.801	0.03 - 0.60	1.00	0.88 - 1.00	1.00
Wenatchee	0.806 - 0.794	0.03 - 0.08	1.00	1.00	1.00
UCR steelhead [1]	0.941 - 0.662	0.000 - 0.870	0.250 - 1.000	0.194 - 1.000	0.970 - 1.000

[1] From Table B-2a, B-2b, B-5 and B-6. Cumulative Risk Initiative. April 7, 2000, appendix tables updated September 2000 (McClure *et al.* 2000a).

2.2.1.2 UCR Steelhead

Information on the status and distribution of UCR steelhead is found in the status review prepared by the NWFSC, NOAA Fisheries (Busby *et al*. 1996). More recent information on the status and distribution of the steelhead ESU, including hatchery components of the respective populations, is provided in the status review update prepared by the West Coast Steelhead Biological Review Team (NMFS 1997) and the Evaluation of the Status of Chinook and Chum Salmon and Steelhead Hatchery Populations for ESUs Identified in Final Listing Determinations prepared by the Conservation Biology Division of the NWFSC, NOAA Fisheries (NMFS 1999a). For more information on steelhead biology, see NOAA Fisheries (2002), and NMFS (2000a).

Most current natural production occurs in the Wenatchee and Methow River systems, with a smaller run returning to the Entiat River (WDF *et al.* 1993). Very limited spawning also occurs in the Okanogan River Basin. Most of the fish spawning in natural production areas are of hatchery origin. The Wenatchee, Methow, and Entiat River populations are not currently self-sustaining.

Although runs during the period 1933 through 1959 may have already been affected by fisheries in the lower river, dam counts suggest a pre-fishery run size of more than 5,000 adults above Rock Island Dam. The return of Upper Columbia River natural-origin steelhead to Priest Rapids Dam declined from a 5-year average of 2,700 beginning in 1986 to a 5-year average of 900 beginning in 1994 (Table 3). Recent escapements at Priest Rapids Dam of both hatchery and natural-origin steelhead have shown an increasing trend reaching 11,331 in 2000. Estimates show an escapement of over 29,900 and 15,800 steelhead past Priest Rapids in 2001 and 2002, respectively. The preliminary estimate for naturally produced steelhead at Rock Island in 2001 and was 16,252. This is well above the escapement goal for natural-origin fish of 4,500 at Priest Rapids Dam. Most current natural production occurs in the Wenatchee and Methow river systems, with a smaller run returning to the Entiat River. Very limited spawning also occurs in the Okanogan River basin. A majority of the fish spawning in natural production areas are of hatchery origin. Prior to the 2000, 2001, and 2002 return years, the indications were that natural populations in the Wenatchee, Methow, and Entiat rivers were not self-sustaining. Even with the recent returns, the long-term self-sufficiency for these natural populations is not a certainty.

This entire ESU has been subjected to heavy hatchery influence; stocks were mixed as a result of the Grand Coulee Maintenance Project, which began in the 1940s (Fish and Hanavan 1948,Mullan *et al.* 1992a). Recently, as part of the development of the Mid-Columbia Habitat Conservation Plan (BAMP 1998), it was determined that steelhead habitat within the range of the Upper Columbia ESU was over-seeded, primarily due to the presence of Wells Hatchery fish in excess of those collected for broodstock. This would partially explain recent observations of low natural cohort replacement rates (0.3 for populations in the Wenatchee River and no greater than 0.25 for populations in the Entiat River; Bugert 1997). The problem of determining appropriate levels of hatchery output to prevent negative effects on natural production is a subject of analysis and review in the Upper Columbia River Quantitative Analytical Report (Cooney 2000). In the meantime, given these uncertainties, efforts are underway to diversify broodstocks used for supplementation and to minimize the differences between hatchery and natural-origin fish (as well as other concerns associated with supplementation). The best use for the Wells Hatchery program in the recovery process is yet to be defined, and should be integrated with harvest activities and recovery measures to optimize the prospects for recovery of the species.

For the Upper Columbia River steelhead ESU as a whole (Table 2), NOAA Fisheries estimates that the average annual population growth rate (lambda) over the base period ranges from 0.94 to 0.66, with the estimate decreasing as the assumed effectiveness of hatchery fish spawning in the wild increases compared to that of fish of natural origin (Appendix B in McClure *et al.* 2000b). The NOAA Fisheries has also estimated the risk of absolute extinction (CRI estimates) for the aggregate Upper Columbia River steelhead population, using the same range of assumptions about the relative effectiveness of hatchery fish. At the low end, assuming that hatchery fish spawning in the wild have not reproduced and therefore that all fish used in the calculation represent successful natural production (i.e., hatchery effectiveness = 0), the risk of absolute extinction within 100 years is 0.25. Assuming that the hatchery fish spawning in the wild have been as productive as wild-origin fish and therefore that natural populations have been less productive than observed numbers of adults would indicate (hatchery effectiveness = 100%), the risk of absolute extinction within 100 years is 1.00. Without substantive improvements in conditions at a variety of life-cycle stages, this ESU is not replacing itself and remains at material risk of extinction. This analysis was last updated in September 2000 and therefore does not include the higher returns observed in 2000 and 2001 or the expected return in 2002.

NOAA Fisheries has also calculated the proportional increase in the average growth rate of the aggregate population that would be needed to reduce the risk of absolute extinction within 100 years to 5% (Appendix B in McClure *et al.* 2000b). Assuming that the effectiveness of hatchery fish has been zero, a 7% increase would be needed in the growth rate of the natural population. The needed change in natural population growth rate rises to 225% if hatchery-origin spawners have been 100% as effective as natural fish.

The CRI analysis associated with the FCRPS opinion will be updated and continue to evolve, and will provide greater certainty about the survival improvements that are required and how best to achieve those improvements. In the meantime, there is additional information on more immediate circumstances that affect the status of the populations that were not accounted for in the CRI and FCRPS analyses. On the negative side, there was a severe drought in the CRB in 2001. This is likely to have the greatest affect on the 2001 juvenile out-migrants and the subsequent adult returns which will occur primarily in 2003 and 2004.

On the more positive side, it is apparent that ocean conditions have improved over the last two or three years, and that many of the stocks are responding favorably to those changing conditions. The return of upriver summer steelhead to Priest Rapids Dam in 2001 was more than twice the next highest return seen since at least 1986. The return of upriver summer steelhead to Priest Rapids Dam in 2002 was 15,898 fish. The returns observed in recent years were not included in the most recent CRI assessment.

We can not be sure that the improved conditions observed in recent years and being observed this year will persist. However, these conditions are more likely to persist if the recent observations portend a shift in the Pacific Decadal Oscillation. Improving ocean conditions may help offset some of the negative affects of the 2001 drought. Improving conditions are not a substitute for sustained improvements in the freshwater habitat conditions, but will certainly help by providing the time necessary to bring the improvements on line.

2.2.2 Factors affecting the Environmental Baseline

Environmental baselines for biological opinions are defined by regulation at 50 CFR 402.02, which states that an environmental baseline is the physical result of all past and present state, Federal, and private activities in the action area along with the anticipated impacts of all proposed Federal projects in the action area (that have already undergone formal or early section 7 consultation). The environmental baseline for this biological opinion is therefore the result of the impacts a great many activities (summarized below) have had on UCR spring chinook salmon and UCR steelhead survival and recovery. Put another way, the baseline is the culmination of the effects that multiple activities have had on the species' *biological* *requirements* and, by examining those individual effects, it is possible to derive the species' status in the action area.

Table 3. Adult Summer Steelhead Counts at Priest Rapids, Rock Island, Rocky Reach, and Wells Dams (FPC 2002)

	Priest Rapids		Rock Island	Rocky Reach	Wells	
Year	**Count**	**Natural**	**Count**	**Count**	**Count**	**Natural**
1978	4,545		3,352	2,453	1,621	
1979	8,409		7,420	4,896	3,695	
1980	8,524		7,016	4,295	3,443	
1981	9,004		7,565	5,524	4,096	
1982	11,159		10,150	6,241	8,418	
1983	31,809		29,666	19,698	19,525	
1984	26,076		24,803	17,228	16,627	
1985	34,701		31,995	22,690	19,757	
1986	22,382	2,342	22,867	15,193	13,234	
1987	14,265	4,058	12,706	7,172	5,195	
1988	10,208	2,670	9,358	5,678	4,415	
1989	10,667	2,685	9,351	6,119	4,608	
1990	7,830	1,585	6,936	5,014	3,819	
1991	14,027	2,799	11,018	7,741	7,715	
1992	14,208	1,618	12,398	7,457	7,120	
1993	5,455	890	4,591	2,815	2,400	
1994	6,707	855	5,618	2,823	2,138	
1995	4,373	993	4,070	1,719	946	
1996	8,376	843	7,305	5,774	4,127	
1997	8,948	785	7,726	7,726	4,107	
1998	5,790	919	4,810	4,265	2,482	314
1999	8,277	not reported	6,361	4,815	3,557	603
2000	11,331	not reported	10,515	8,272	6,280	1,787
2001	29,937	not reported	28,602	21,954	17,407	8,381
2002	15,898	not reported	15,286	11,842	9,459	5,841

Many of the biological requirements for UCR spring chinook salmon and UCR steelhead in the action area can best be expressed in terms of essential habitat features. That is, the ESUs require adequate: (1) substrate (especially spawning gravel), (2) water quality, (3) water quantity, (4) water temperature, (5) water velocity, (6) cover/shelter, (7) food, (8) riparian vegetation, (9) space, and (10) migration conditions (February 16, 2000, 65 FR 7764). The best scientific information presently available demonstrates that a multitude of factors, past and present, have contributed to the decline of west coast salmonids by adversely affecting these essential habitat features. NOAA Fisheries reviewed much of that information in its recently reinitiated Consultation on Operation of the Federal Columbia River Power System (FCRPS) (NMFS 2000). That review is summarized in the sections below.

2.2.2.1 The Mainstem Hydropower System

Hydropower development on the Columbia River has dramatically affected anadromous salmonids in the basin. Storage dams have eliminated spawning and rearing habitat and altered the natural hydrograph of the Snake and Columbia Rivers – decreasing spring and summer flows and increasing fall and winter flows. Power operations cause flow levels and river elevations to fluctuate – slowing fish movement through reservoirs, altering riparian ecology, and stranding fish in shallow areas. The 13 dams in the Snake and Columbia River migration corridors kill smolts and adults and alter their migrations. The dams have also converted the once-swift river into a series of slow-moving reservoirs – slowing the smolts' journey to the ocean and creating habitat for predators. Because the UCR spring chinook salmon and UCR steelhead must navigate up to nine major hydroelectric projects during their up- and downstream migrations (and experience the effects of other dam operations occurring upstream from their ESU boundary), they feel the influence of all the impacts listed above. For more information on the effects of the mainstem hydropower system, please see NMFS (2000) and NOAA Fisheries (2002).

2.2.2.2 Human-Induced Habitat Degradation

The quality and quantity of freshwater habitat in much of the Columbia River Basin have declined dramatically in the last 150 years. Forestry, farming, grazing, road construction, hydrosystem development, mining, and other development have radically changed habitat conditions in the basin. Water quality in streams throughout the Columbia River Basin has been degraded by human activities such as dams and diversion structures, water withdrawals, farming and animal grazing, road construction, timber harvest activities, mining activities, and development. Over 2,500 streams, river segments, and lakes in the Northwest do not meet Federally-approved, state and Tribal water quality standards and are now listed as water quality limited under section 303(d) of the Clean Water Act. Tributary water quality problems contribute to poor water quality when sediment and contaminants from the tributaries settle in mainstem reaches and the estuary.

Most of the water bodies in Oregon, Washington, and Idaho on the 303(d) list do not meet water quality standards for temperature. High water temperatures adversely affect salmonid metabolism, growth rate, and disease resistance, as well as the timing of adult migrations, fry emergence, and smoltification. Many factors can cause high stream temperatures, but they are primarily related to land-use practices rather than point-source discharges. Some common actions that cause high stream temperatures are the removal of trees or shrubs that directly shade streams, water withdrawals for irrigation or other purposes, and warm irrigation return flows. Loss of wetlands and increases in groundwater withdrawals contribute to lower base-stream flows which, in turn, contribute to temperature increases. Activities that create shallower streams (e.g., channel widening) also cause temperature increases.

Pollutants also degrade water quality. Salmon require clean gravel for successful spawning, egg incubation, and the emergence of fry. Fine sediments clog the spaces between gravel and restrict the flow of oxygen-rich water to the incubating eggs. Excess nutrients, low levels of dissolved oxygen, heavy metals, and changes in pH also directly affect the water quality for salmon and steelhead.

Water quantity problems are also an important cause of habitat degradation and reduced fish production. Millions of acres of land in the basin are irrigated. Although some of the water withdrawn from streams eventually returns as agricultural runoff or groundwater recharge, crops consume a large proportion of it. Withdrawals affect seasonal flow patterns by removing water from streams in the summer (mostly May through September) and restoring it to surface streams and groundwater in ways that are difficult to measure. Withdrawing water for irrigation, human consumption, and other uses increases temperatures, smolt travel time, and sedimentation. Return water from irrigated fields introduces nutrients and pesticides into streams and rivers. Water withdrawals (primarily for irrigation) have lowered summer flows in nearly every stream in the basin and thereby profoundly decreased the quantity and quality of habitat.

Blockages that stop downstream and upstream fish movement exist at many dams and barriers, whether they are for agricultural, hydropower, municipal/industrial, or flood control purposes. Culverts that are not designed for fish passage also block upstream migration. Migrating fish are often killed when they are diverted into unscreened or inadequately screened water conveyances or turbines. While many fish-passage improvements have been made in recent years, manmade structures continue to block migrations or kill fish throughout the basin.

On the landscape scale, human activities have affected the timing and amount of peak water runoff from rain and snowmelt. Forest and range management practices have changed vegetation types and density which, in turn, affect runoff timing and duration. Many riparian areas, flood plains, and wetlands that once stored water during periods of high runoff have been destroyed by development that paves over or compacts soil – thus increasing runoff and altering its natural pattern.

Land ownership has also played its part in the region's habitat and land-use changes. Federal lands, which compose 50 percent of the basin, are generally forested and influence upstream portions of the watersheds. While there is substantial habitat degradation across all ownerships, in general, habitat in many headwater stream sections is in better condition than in the largely non-Federal lower portions of tributaries (Doppelt *et al*. 1993; Frissell 1993; Henjum *et al*. 1994;

Quigley and Arbelbide 1997). In the past, valley bottoms were among the most productive fish habitats in the basin (Stanford and Ward 1992; Spence *et al*. 1996; ISG 1996). Today, agricultural and urban land development and water withdrawals have substantially altered the habitat for fish and wildlife. Streams in these areas typically have high water temperatures, sedimentation problems, low flows, simplified stream channels, and reduced riparian vegetation.

At the same time UCR spring chinook and steelhead habitat was being destroyed by water withdrawals, water impoundments in other areas dramatically reduced UCR spring chinook and steelhead habitat by inundating large amounts of spawning and rearing habitat and reducing migration corridors, for the most part, to a single channel. Floodplains have been reduced in size, off-channel habitat features have been lost or disconnected from the main channel, and the amount of large woody debris (large snags/log structures) in rivers has been reduced. Most of the remaining habitats are affected by flow fluctuations associated with reservoir management.

The Columbia River estuary (through which all the basin's species – including UCR spring chinook and steelhead – must pass) has also been changed by human activities. Historically, the downstream half of the estuary was a dynamic environment with multiple channels, extensive wetlands, sandbars, and shallow areas. The mouth of the Columbia River was about four miles wide. Winter and spring floods, low flows in late summer, large woody debris floating downstream, and a shallow bar at the mouth of the Columbia River kept the environment dynamic. Today, navigation channels have been dredged, deepened, and maintained; jetties and pile-dike fields have been constructed to stabilize and concentrate flow in navigation channels; marsh and riparian habitats have been filled and diked; and causeways have been constructed across waterways. These actions have decreased the width of the mouth of the Columbia River to two miles and increased the depth of the Columbia River channel at the bar from less than 20 to more than 55 feet. Sand deposition at river mouths has extended the Oregon coastline approximately four miles seaward and the Washington coastline approximately two miles seaward (Thomas 1981).

More than 50 percent of the original marshes and spruce swamps in the estuary have been converted to industrial, transportation, recreational, agricultural, or urban uses. More than 3,000 acres of intertidal marsh and spruce swamps have been converted to other uses since 1948 (Lower Columbia River Estuary Program 1999). Many wetlands along the shore in the upper reaches of the estuary have been converted to industrial and agricultural lands after levees and dikes were constructed. Furthermore, water storage and release patterns from reservoirs upstream of the estuary have changed the seasonal pattern and volume of discharge. The peaks of spring/summer floods have been reduced, and the amount of water discharged during winter has increased.

Human-caused habitat alterations have also increased the number of predators feeding on UCR spring chinook salmon and steelhead. For example, researchers estimated that a population of terns on Rice Island (created under the Columbia River Channel Operation and Maintenance

Program) consumed six to 25 million out-migrating salmonid smolts during 1997 (Roby *et al*. 1998) and seven to 15 million out-migrating smolts during 1998 (Collis *et al*. 1999). Even after considerable efforts by Federal and state agencies, between 5 and 7 million smolts were consumed in 2001. As another example, populations of Northern pikeminnow (a salmonid predator) in the Columbia River has skyrocketed since the advent of the mainstem dams and their warm, slow-moving reservoirs.

To counteract all the ill effects listed in this section, Federal, state, tribal, and private entities have – singly and in partnership – begun recovery efforts to help slow and, eventually, reverse the decline of salmon and steelhead populations. Nevertheless, while these efforts represent a number of good beginnings, it must be stated that much remains to be done to recover UCR spring chinook salmon and UCR steelhead. Full discussions of these efforts can be found in the FCRPS biological opinion (NMFS 2000).

2.2.2.3 Hatcheries

For more than 100 years, hatcheries in the Pacific Northwest have been used to (a) produce fish for harvest and (b) replace natural production lost to dam construction and other development – not to protect and rebuild naturally produced salmonid populations. As a result, most salmonids returning to the region are primarily derived from hatchery fish. In 1987, for example, 95 percent of the coho salmon, 70 percent of the spring chinook salmon, 80 percent of the summer chinook salmon, 50 percent of the fall chinook salmon, and 70 percent of the steelhead returning to the Columbia River Basin originated in hatcheries (CBFWA 1990). Because hatcheries have traditionally focused on providing fish for harvest, it is only recently that the substantial effects of hatcheries on native natural populations been demonstrated. For example, the production of hatchery fish, among other factors, has contributed to the 90 percent reduction in natural coho salmon runs in the lower Columbia River over the past 30 years (Flagg *et al.* 1995).

NOAA Fisheries has identified four primary ways hatcheries harm wild-run salmon and steelhead: (1) ecological effects, (2) genetic effects, (3) overharvest effects, and (4) masking effects (NMFS 2000). Ecologically, hatchery fish can predate on, displace, and compete with natural fish. These effects are most likely to occur when fish are released in poor condition and do not migrate to marine waters, but rather remain in the streams for extended rearing periods. Hatchery fish also may transmit hatchery-borne diseases, and hatcheries themselves may release disease-carrying effluent into streams. Hatchery fish can affect the genetic variability of native fish by interbreeding with them. Interbreeding can also result from the introduction of stocks from other areas. Interbred fish are less adapted to the local habitats where the original native stock evolved and may therefore be less productive there.

In many areas, hatchery fish provide increased fishing opportunities. However, when natural fish mix with hatchery stock in these areas, naturally produced fish can be overharvested. Moreover, when migrating adult hatchery and natural fish mix on the spawning grounds, the health of the natural runs and the habitat's ability to support them can be overestimated because the hatchery fish mask the surveyors' ability to discern actual natural run status.

Currently, the role hatcheries play in the Columbia Basin is being redefined under the Basinwide Salmon Recovery Strategy (Federal Caucus 2000) from simple production to supporting species recovery. These efforts will focus on maintaining species diversity and supporting weak stocks. The program will also have an associated research element designed to clarify interactions between natural and hatchery fish and quantify the effects supplementation has on natural fish. The final facet of the strategy is to use hatcheries to create fishing opportunities that are benign to listed populations (e.g., terminal area fisheries). For more detail on the use of hatcheries in recovery strategies, please see the Basinwide Salmon Recovery Strategy.

2.2.2.4 Harvest

Salmon and steelhead have been harvested in the Columbia basin as long as there have been people there. For thousands of years, native Americans have fished on salmon and other species in the mainstem and tributaries of the Columbia River for ceremonial and subsistence use and for barter. Salmon were possibly the most important single component of the native American diet, and were eaten fresh, smoked, or dried (Craig and Hacker 1940; Drucker 1965). A wide variety of gears and methods were used, including hoop and dip nets at cascades such as Celilo and Willamette Falls, to spears, weirs, and traps (usually in smaller streams and headwater areas) (NRC 1996; Drucker 1965).

Commercial fishing developed rapidly with the arrival of European settlers and the advent of canning technologies in the late 1800s. The development of non-Indian fisheries began in about 1830; by 1861, commercial fishing was an important economic activity. The early commercial fisheries used gill nets, seines hauled from shore, traps, and fish wheels. Later, purse seines and trolling (using hook and line) fisheries developed. Recreational fishing began in the late 1800s, occurring primarily in tributary locations (ODFW and WDFW 1998). Steelhead have formed a major component of these fisheries for decades.

Initially, the non-Indian fisheries targeted spring and summer chinook salmon, and these runs dominated the commercial harvest during the 1800s. Eventually the combined ocean and freshwater harvest rates for Columbia River spring and summer chinook salmon exceeded 80 percent and sometimes 90 percent of the run – accelerating the species' decline (Ricker 1959). From 1938 to 1955, the average harvest rate dropped to about 60 percent of the total spring chinook salmon run and appeared to have a minimal effect on subsequent returns (NMFS 1991). Until the spring of 2000 – when a relatively large run of hatchery spring chinook salmon returned and provided a small commercial Tribal fishery – no commercial season for spring chinook salmon had taken place since 1977. Present Columbia River harvest rates are very low compared with those from the late 1930s through the 1960s (NMFS 1991). Though steelhead – UCR steelhead included – were never as important a component of the Columbia basin's fisheries as chinook, net-based fisheries generally do not discriminate among species, so it can fairly be said that harvest has also contributed to the UCR steelhead declines.

Salmonids' capacity to produce more adults than are needed for spawning offers the potential for sustainable harvest of naturally produced (versus hatchery-produced) fish. This potential can be realized only if two basic management requirements are met: (1) enough adults return to spawn and perpetuate the run, and (2) the productive capacity of the habitat is maintained. Catches may fluctuate in response to such variables as ocean productivity cycles, periods of drought, and natural disturbance events, but as long as the two management requirements are met, fishing can be sustained indefinitely. Unfortunately, both prerequisites for sustainable harvest have been violated routinely in the past. The lack of coordinated management across jurisdictions, combined with competitive economic pressures to increase catches or to sustain them in periods of lower production, resulted in harvests that were too high and escapements that were too low. At the same time, habitat has been increasingly degraded, reducing the capacity of the salmon stocks to produce numbers in excess of their spawning escapement requirements.

Fish harvest in the Columbia River basin affects the listed species by incidentally taking them in fisheries that target non-listed species. UCR spring chinook and UCR steelhead are not harvested in ocean fisheries (Chapman *et al.* 1995). The largest potential impacts on UCR spring chinook and UCR steelhead come from treaty Indian and non-tribal fisheries in the Columbia River mainstem (Myers *et al.* 1998). Most take is in the form of catch and retention, mortalities resulting from hooking and release, and mortalities resulting from encounters with fishing gear as a consequence of fishery activities. Two recent opinions describe harvest rate impacts from mainstem Columbia River fisheries accruing to listed salmonids. Both opinions conclude that, due to the constraints set on harvest levels as described in the opinions, the activities associated with the treaty Indian and non-tribal fisheries during the winter/spring/summer and fall seasons were not likely to jeopardize the continued existence of any of the listed species (NMFS 2001a; NMFS 2001b). The development of fishery regimes for the Columbia River mainstem includes evaluation of escapement needs and impacts to Upper Columbia River spring chinook and UCR steelhead.

2.2.2.5 Natural Conditions

Natural changes in the freshwater and marine environments play a major role in salmonid abundance. Recent evidence suggests that marine survival among salmonids fluctuates in response to 20- to 30-year cycles of climatic conditions and ocean productivity (Hare *et al.* 1999). This phenomenon has been referred to as the Pacific Decadal Oscillation; this has also been referred to as the Bidecadal Oscillation (Mantua *et al.* 1997). In addition, large-scale climatic regime shifts, such as El Niño, appear to change ocean productivity. During the first part of the 1990s, much of the Pacific Coast was subject to a series of very dry years. More recently, severe flooding has adversely affected some stocks (e.g., the low returns of Lewis River bright fall chinook salmon in 1999).

A key factor affecting many West Coast stocks—including UCR spring chinook salmon and UCR steelhead—has been a general 30-year decline in ocean productivity. The mechanism whereby stocks are affected is not well understood, partially because the pattern of response to these changing ocean conditions has differed among stocks—presumably due to differences in their ocean timing and distribution. It is presumed that survival is driven largely by events occurring between ocean entry and recruitment to a subadult life stage (NMFS 2000).

Salmon and steelhead are exposed to high rates of natural predation, particularly during freshwater rearing and migration stages. Ocean predation may also contribute to substantial natural mortality, although it is not know to what degree. In general, salmonids are prey for pelagic fishes, birds, and marine mammals, including harbor seals, sea lions, and killer whales. There have been recent concerns that the rebound of seal and sea lion populations – following their protection under the Marine Mammal Protection Act of 1972 – has caused a substantial number of salmonid deaths.

2.2.2.6 Summary

In conclusion, the picture of whether UCR spring chinook salmon and UCR steelhead biological requirements are being met is more clear-cut for habitat-related parameters than it is for population factors: given all the factors for decline—even taking into account the corrective measures being implemented—it is still clear that the UCR spring chinook salmon and UCR steelhead ESUs' biological requirements are currently not being met under the environmental baseline. Thus their status is such that there must be a substantial improvement in the environmental conditions of their habitat (over those currently available under the environmental baseline). Any further degradation of the environmental conditions could have a large impact because the ESUs are already at risk. In addition, there must be efforts to minimize impacts caused by dams, harvest, hatchery operations, habitat degradation, and unfavorable natural conditions.

3.0 Effects of the Action

The purpose of this section is to identify what effects NOAA Fisheries' issuance of an incidental take statement will have on endangered UCR spring chinook salmon and UCR steelhead. To the extent possible, this will include analyzing effects at the population level. Where information on UCR spring chinook salmon and UCR steelhead is lacking at the population level, this analysis assumes that the status of each affected population is parallel to that of the ESU as a whole. The method NOAA Fisheries uses for evaluating effects is discussed first, followed by discussions of the general effects fishery activities are known to have.

3.1 Evaluating the Effects of the Action

3.1.1 Applying ESA section 7(a)(2) standards

Over the course of the last decade and hundreds of ESA section 7 consultations, NOAA Fisheries developed the following four-step approach for applying the ESA section 7(a)(2) standards when determining what effect a proposed action is likely to have on a given listed species. What follows here is a summary of that approach; for more detail please see *The Habitat Approach: Implementation of Section 7 of the Endangered Species Act for Actions Affecting the Habitat of Pacific Salmonids* (NMFS 1999b).

1. Define the biological requirements and current status of each listed species.

2. Evaluate the relevance of the environmental baseline to the species' current status.

3. Determine the effects of the proposed or continuing action on listed species and their habitat.

4. Determine whether the species can be expected to survive with an adequate potential for recovery under (a) the effects of the proposed (or continuing) action, (b) the effects of the environmental baseline, and (c) any cumulative effects—including all measures being taken to improve salmonid survival and recovery.

The fourth step above requires a two-part analysis. The first part focuses on the action area and defines the proposed action's effects in terms of the species' biological requirements in that area (i.e., impacts on essential habitat features). The second part focuses on the species itself. It describes the action's impact on individual fish—or populations, or both—and places that impact in the context of the ESU as a whole. Ultimately, the analysis seeks to answer the questions of whether the proposed action is likely to jeopardize a listed species' continued existence or destroy or adversely modify its critical habitat.

3.1.2 Effects on Habitat

Previous sections have detailed the scope of the UCR spring chinook salmon and UCR steelhead habitat in the action area, described the essential features of that habitat, and depicted its present condition. The discussion here focuses on how those features are likely to be affected by the proposed actions.

The fishing activities will likely occur in a small area, about ½ mile, from the base of the dam. The type of gear and method of fishing in the proposed fishery are minimally intrusive in terms of their effect on habitat. None of them will measurably affect any of the 10 essential fish habitat features listed earlier (i.e., stream substrates, water quality, water quantity, food, streamside vegetation, etc.). Moreover, the proposed activities are all of short duration. Therefore, NOAA Fisheries concludes that the proposed activities are unlikely to have an adverse impact on UCR spring chinook salmon and UCR steelhead habitat, and thus will have little, if any, effect on the contribution of that habitat to the species' likelihood of survival and recovery.

3.2 Effects on Listed Salmonids

3.2.1 Effects on UCR Spring Chinook Salmon

The near total absence of spring chinook in past years' fisheries suggests that, in most years, there will be no impacts on the listed UCR spring chinook ESU during the Chief Joseph Dam tailrace fishery under the proposed management plan. However, in years like 2001 and 2002, with increased spring chinook returns, a few individual UCR spring chinook (less than 0.1% of the run) may be taken. The potential impacts on the UCR spring chinook ESU include only potential impacts to the Methow population. The Entiat and Wenatchee populations will not be affected under the proposed management plan, as they originate downstream of Wells Dam.

UCR spring chinook will be largely unaffected by the proposed fishery because of their run timing and the start date of the proposed annual fishery. UCR spring chinook salmon enter the Columbia River in late February through the end of May. The upstream migration past Wells Dam (Methow stock) begins in early May, peaks during mid-June and ends in late June. Spring chinook begin spawning in mid-July and peak during early August. By early to mid-July, most adult spring chinook have moved into their spawning habitat and abandoned the fishing area for most of the fishery's July through October time frame.

Based upon creel census data, no spring chinook salmon were harvested during 1994 thru 1996 and 1998 thru 2000. The only known harvest of spring chinook salmon at the Chief Joseph Dam tailrace fishery prior to 2001 occurred during 1997. The 4 coded-wire-tagged spring chinook salmon harvested during 1997 were from the Clearwater River drainage (1 Crooked River; 3 Dworshak NFH), which are not listed. Until the unusually large returns in 2001 and 2002, no UCR hatchery-origin spring chinook salmon had ever been observed in the proposed fishery.

In 2001, the CCT had difficulties obtaining reliable creel census data for the fishery, but have since corrected these personnel problems. In 2002, out of 706 chinook sampled during July and August, three fish were hatchery-origin spring chinook (1 listed Winthrop 1998 broodstock spring chinook; 1 unlisted Winthrop 1998 broodstock spring chinook; 1 Methow 1997 broodstock spring chinook). Out of an estimated total harvest of 2,189 summer chinook during July - August, 2002, nine are estimated to be hatchery-origin UCR spring chinook. Out of these nine fish, only an estimated six fish are listed and all were observed in the month of July, when, due to the unusually large run in 2002, a few fish were still present in the action area. The expected harvest of UCR spring chinook salmon for the 11 years duration of the plan will most likely fluctuate between zero fish and levels comparable to those observed in 2002 (6 listed fish).

That is the equivalent to between 0% and less than 1% of the Methow River population (only the Methow River population of the UCR spring chinook ESU may be impacted by the proposed fishery management plan).

3.2.2 Effects on UCR Steelhead

Table 4 presents Wells Dam counts and harvest information. After UCR steelhead were listed in 1997, the CCT took important steps to modify its fisheries to reduce impacts on the ESU. Specific action was taken to reduce the effect on UCR steelhead of the Chief Joseph Dam tailrace fishery. Prior to 1998, the harvest rate of steelhead crossing Wells Dam was 3.6%. In 1998, in response to the listing and concerns about listed steelhead, the CCT began managing their fishery at Chief Joseph Dam through a quota system, proposing to close the fishery once 200 steelhead were caught. In 2001, the CCT proposed to reduce that quota to 100 steelhead. However, fewer than that number were caught during most years since 1998.As a result of this more conservative management, the harvest rate on total and natural-origin steelhead since 1998 has averaged 1.41% and 1.75%, respectively.

For 2002, the CCT developed a different harvest management strategy, which they propose to implement for the next 11 years, through 2012. In particular, the CCT propose to use an abundance-based harvest rate schedule to limit effects on listed UCR steelhead (Nicholson 2002 a, b and c) that may occur while targeting summer/fall chinook. This abundance-based mortality rate schedule (Table 5) sets mortality rate limits for wild UCR steelhead that vary according to run size of steelhead, as measured by counts at Wells Dam. The mortality rate schedule has provisions which would substantially reduce the allowed incidental mortality for steelhead resulting from implementation of the proposed fishery in years when the steelhead counts over Wells Dam are low.

At the low end of the range, when total steelhead counts at Wells Dam are less than 1,000 fish, the maximum mortality rate on hatchery-origin (marked) fish would be 3%, as a proportion of fish crossing Wells Dam, and for natural-origin (unmarked) fish, 1%. At the middle of the range, when UCR steelhead counts at Wells Dam are from 3,000 to 5,000 fish, the maximum mortality rate on hatchery-origin (marked) fish would be 15%, and for natural-origin (unmarked) fish, 3%. At the high end of the range, when total steelhead count over Wells Dam is greater than 10,000 fish, the maximum mortality rate on hatchery-origin (marked) fish would be 50%, and for natural-origin (unmarked) fish, 10%. The CCT propose to use mortality rate instead of harvest rate in order to account for the loss of fish that will be hooked and killed, but not landed. The CCT assume that 50% of the fish that are hooked but not landed will die as a result of injuries. For every two fish hooked but not landed, it is assumed that one fish dies as a result of the injuries sustained. The mortalities resulting from fish hooked but not landed count towards the catch composition of the catch apportioned according to the observed catch composition and towards the mortality rate ceiling derived from Table 5. The CCT propose intensive monitoring of this fishery and collecting creel census data to account for harvest and drop-off mortality for this fishery.

Table 4. Wild and hatchery steelhead counts for Priest Rapids and Wells Dam and harvest at Chief Joseph Dam Tribal fishery from 1980 to 2000.

Year	Wells Dam Count[1]	CCT Total Harvest[2]	CCT Total Mortality Rate	Wells Wild Count	CCT Wild Harvest[2]	CCT Wild Mortality Rate
1980	3,369	21	0.62%		No Data	
1981	4,014	130	3.24%		No Data	
1982	7,811	122	1.56%		No Data	
1983	18,848	207	1.10%		No Data	
1984	16,431	153	0.93%		No Data	
1985	19,757	694	3.51%		No Data	
1986	13,234	819	6.19%	397[2]	No Data	
1987	5,195	238	4.58%	644[2]	No Data	
1988	4,415	180	4.08%	288[2]	No Data	
1989	4,608	52	1.13%	604[2]	No Data	
1990	3,819	130	3.40%	474[2]	17	3.59%
1991	7,715	170	2.20%	826[2]	12	1.45%
1992	7,073	346	4.89%	384[2]	9	2.34%
1993	2,400	88	3.67%	187[2]	No Data	
1994	2,183	113	5.18%		14	
1995	945	49	5.19%		4	
1996	4,127	218	5.28%		9	
1997	4,107	223	5.43%		8	
1998	2,668	80	3.00%	314[1]	9	2.87%
1999	3,557	12	0.34%	603[1]	5	0.83%
2000	6,280	38	0.61%	1,787[1]	38	2.13%
2001	18,483	228[3]	1.23%	8,381[1]	90[3]	1.07%
2002	9,459	179[3]	1.89%	5,841[1]	107[3]	1.83%

[1] Fish Passage Center 2002
[2] Nicholson 2002a,b,c
[3] Jerry Marco (Personal communication. December 4, 2002))

The CCT's ability to manage fisheries according to the proposed sliding-scale mortality rate schedule described on Table 5 depends on obtaining accurate and timely steelhead counts over Wells Dam. The Fish Passage Center (FPC) currently provides daily inseason total and wild (unmarked) steelhead counts over Wells Dam. One complication with these data is that "wild" steelhead counts over Wells Dam provided by the FPC include true natural-origin fish combined with unmarked hatchery-origin fish from the supplementation program. However, since tribal fishers are not able to distinguish between natural-origin and unmarked hatchery-origin steelhead killed during the fishery, using the FPC total and wild counts as denominators when calculating the allowed mortality rates is still appropriate and likely conservative. For example, in a year with 7,000 and 2,000 total and "wild" counts, respectively, over Wells Dam, the allowed mortality rate for marked hatchery-origin fish derived from Table 5 would be 30% of 5,000 marked steelhead (or 1,500 marked fish), and 5% of 2,000 unmarked steelhead (or 100 unmarked fish). Even if the 2,000 "wild" fish count at Wells Dam is comprised of 500 natural-origin and 1,500 unmarked hatchery-origin steelhead for example, the mortality of 100 unmarked steelhead in the non-selective tribal snag fishery would represent the mortality of 25 natural-origin and 75 unmarked hatchery-origin steelhead, or 5% of the counts, respectively for each of these two groups. Under the proposed abundance-based mortality rate schedule, the trigger for closing the fishery for this example would be the mortality of 1,500 marked hatchery-origin steelhead or the mortality of 100 unmarked steelhead, whichever comes first. Assuming both triggers are reached simultaneously and the total mortality is 1,500 marked and 100 unmarked steelhead, the resulting escapement in this hypothetical example would be 5,400 total steelhead over Wells Dam (3,500 and 1,900 marked and unmarked steelhead, respectively). The interim abundance target for above Wells Dam (Methow River sub-basin) is 2,500 natural spawners (Lohn 2002).

The proposed harvest rate for hatchery (unmarked) and wild (marked) steelhead in Table 5 is determined by the total counts over Wells Dam. However, in a year with a high proportion of unmarked steelhead, the trigger would likely be on based the limit for unmarked fish. Since the allowed mortality rate for unmarked steelhead is much lower than for marked steelhead for every step in the proposed sliding scale mortality rate schedule, it is likely that, under those conditions, the limit for unmarked fish may be reached first, and the fishery will have to close short of the limit for marked fish. The proposed abundance-based, sliding scale mortality rate schedule proposed by the CCT is conservative with respect to natural-origin steelhead over Wells Dam. The proposed mortality rate schedule allows a maximum of 10% fishery related mortality even in a year like 2002, when the expected returns of unmarked (wild) fish is expected to be over twice the interim abundance targets, and likely exceeding the carrying capacity of the UCR sub-basins upstream of Wells Dam.

The CCT proposed to conduct their fishery from July 1 through October 31 of each year. Because of the relative timing and abundance of summer/fall chinook and steelhead in the fishery area, NOAA Fisheries is concerned that the impacts to steelhead would increase late in the season, even to the extent that the catch of steelhead would predominate. As a result, the CCT further proposed that the fishery would close if the catch composition exceeds 50% steelhead on any given day, or 40% steelhead on a 3-day rolling average. The fishery would be closed for the year once one of the catch composition triggers was hit or when the mortality rate threshold was hit, whichever comes first. Daily monitoring of the fishery as proposed by the CCT, is crucial, especially at the latter part of the fishery.

Table 5. Harvest Thresholds for Upper Columbia River Steelhead. Mortality rate includes all fish harvested, plus 50% of the fish hooked but not landed.

Steelhead Count at Wells Dam	Maximum CCT Mortality Rate on Hatchery-origin	Maximum CCT Mortality Rate on Natural-origin
< 1,000	3%	1%
1001 – 2,000	5%	1%
2,001 – 3,000	7%	2%
3,001 – 5,000	15%	3%
5,001 – 10,000	30%	5%
10,001 +	50%	10%

4.0 CUMULATIVE EFFECTS

Cumulative effects include the effects of future state, tribal, local or private actions not involving Federal activities that are reasonably certain to occur within the action area subject to this consultation. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the Act.

State, tribal and local government actions will likely be in the form of legislation, administrative rules or policy initiatives. Government and private actions may encompass changes in land and water uses — including ownership and intensity — any of which could impact listed species or their habitat. Government actions are subject to political, legislative, and fiscal uncertainties. These realities, added to the geographic scope of the action area which encompasses numerous government entities exercising various authorities and the many private landholdings, make any analysis of cumulative effects difficult and speculative. For more information on the various efforts being made at the local, tribal, state, and national levels to conserve UCR spring chinook salmon and UCR steelhead and other listed species, see NOAA Fisheries (2002).

Non-Federal actions are likely to continue affecting listed species. The cumulative effects in the action area are difficult to analyze because of the Opinion's large geographic scope, the different resource authorities in the action area, the uncertainties associated with government and private actions, and the changing economies of the region. Whether these effects will increase or decrease is a matter of speculation; however, based on the trends identified in the baseline, the adverse cumulative effects are likely to increase. Although state, tribal and local governments have developed plans and initiatives to benefit listed fish, they must be applied and sustained in a comprehensive way before NOAA Fisheries can consider them "reasonably foreseeable" in its analysis of cumulative effects.

5.0 INTEGRATION AND SYNTHESIS OF EFFECTS

5.1 UCR Spring Chinook

The timing of the CCT's Chief Joseph Dam tailrace fishery is specifically designed to avoid impacts on UCR spring chinook. The absence of UCR spring chinook coded-wire tags (CWT) recovered in this fishery before 2001 suggest that harvest impacts on this ESU were negligible. Only in 2001 and 2002, when the average observed spring chinook counts over Wells Dam increased to over ten times the previous 10-year average, and fishing effort on summer/fall chinook was higher than average, a few coded-wire-tagged spring chinook were recovered in the fishery. In 2002, the estimated mortality rate, based on Wells Dam count and creel census data, for the UCR spring chinook ESU in the fishery (Methow and Okanogan fish), was 0.1% of the run over Wells Dam and 0.026% of the ESU as a whole. The limited impacts of the proposed fishery on the UCR spring chinook ESU, even in a year like 2002, only accrue to the Methow population. The Wenatchee and Entiat populations are downstream from Wells Dam and are unaffected by the proposed multi-year management plan for the Chief Joseph Dam tailrace fishery. Only one population (Methow River basin) may be affected by the proposed action. The other two populations (Wenatchee and Entiat rivers) are not affected by the proposed action. Because the effects on the Methow River basin population are small, the effects on the ESU as a whole are expected to be extremely small.

5.2 UCR Steelhead

In the UCR steelhead ESU, only the Methow and Okanogan populations may be affected by the proposed fishery. The CCT have proposed a harvest management plan that would be implemented through 2012. The sliding-scale mortality rate schedule for UCR steelhead proposed by the CCT for the Chief Joseph Dam tailrace snag fishery during 2002-2012 is linked to yearly steelhead counts over Wells Dam (Table 5). The proposed harvest rate schedule will continue to constrain future fisheries when returns are low and allow for modest increases only when returns are substantially higher relative to the critical and interim recovery levels (300 and 2,500, respectively, in the Methow River). It is necessary to consider the effects on the ESU over the full range of anticipated returns. The particular circumstances in 2002 provide a good example to illustrate how the plan would work when the abundance of steelhead is high, allowing the highest harvest rate of the proposed range. We have also considered examples from earlier years to consider the effects of the plan when steelhead run sizes are at low or intermediate levels.

In addition to the limits imposed by the mortality rate schedule presented in Table 5, there are other provisions which could result in the closure of this fishery. Since the proposed fishery is directed at UCR summer/fall chinook and not on UCR steelhead, if the catch composition of harvested fish reaches 40% steelhead for three consecutive days, or 50% steelhead on any given day, the fishery would be closed. This provision is intended to further limit impacts to steelhead and close the fishery if its purpose of targeting summer/fall chinook can no longer be justified.

The proposed fishery for the years 2002-2012 is generally consistent with the assumptions of the recent Federal Columbia River Power System (FCRPS) biological opinion (NMFS 2000). In considering the effects of harvest on listed steelhead, the FCRPS opinion estimated the expected survival improvements resulting from reduced harvest. The FCRPS analysis for steelhead focused on mainstem fisheries and compared the observed harvest rates from 1984 to 1997 (16.1%) with the current and expected future harvest rates (10.1%) for A-run steelhead, including those returning to the Upper Columbia River. The 37.3% reduction in harvest rate translates to a 7.2% increase in survival. The CCT fishery was not explicitly considered in the analysis, but the analytical framework can still be applied. The average harvest rate on steelhead passing Wells Dam taken in the CCT fishery prior to 1998 was 3.6%. After the listing, the Tribes modified their fishery explicitly to minimize steelhead impacts. The average harvest rate since 1998 is 1.3%. This represents a 64% reduction in harvest and a resulting survival improvement of 2.4%. Therefore, the previous fishery management changes made by the Tribes improved on the environmental baseline for the Methow/Okanogan stock, even though some limited incidental impacts associated with this fishery remain. In a year like 2002, when steelhead passage at Wells Dam was 9,459 fish, the harvest rate schedule allows up to 5% harvest rate on wild steelhead. However, even with the proposed mortality rate schedule, the expected escapement will exceed, by several thousand fish the interim abundance level of natural 2,500 spawners in the Methow River.

Steelhead harvest rates have been substantially reduced in recent years, further actions are being taken to reduce harvest, and the expected impacts associated with abundance-based sliding-scale harvest rate schedule included in the Chief Joseph Dam fishery management plan are sufficiently low to avoid appreciably reducing the likelihood of survival of the species. However, ongoing assessment of the status of the stocks and the environmental baseline will be critical.

NOAA Fisheries, as a matter of policy, has not sought to eliminate harvest and has accepted a certain measure of increased risk to the species to provide limited harvest opportunity, particularly to the tribes in recognition of their treaty rights and the Federal government's trust responsibility. Even so, the associated impacts must be accounted for and held to acceptable levels.

Any action that involves take, for that matter, involves some increase in the level of risk to the species. The CCT's views, as expressed in their plan, regarding the assumption of risk associated with their fisheries have substantial merit. The CCT have both a right and priority to conduct their fisheries within the limits of conservation constraints. Because of the Federal government's trust relationship with the tribes, NOAA Fisheries is committed to considering the CCT's judgment and expertise when it comes to the conservation of trust resources. However, the opinion of the CCT and their immediate interest in fishing must be balanced against NOAA

Fisheries' responsibility pursuant to the ESA to ensure the survival and recovery of listed species and its trust responsibility which requires consideration of the long-term interests of the tribes as well. The CCT's long-term interests clearly require that the fishery resources be conserved even if that requires compromising short-term fishing objectives. The CCT have designed fisheries that, as described in the plan provided by the BIA, are intended to achieve this balance.

6.0 CONCLUSION

After reviewing the current status of the UCR spring chinook salmon and UCR steelhead ESUs considered in this opinion, the environmental baseline for the action area, the effects of the proposed fisheries as set forth in the fishery management plan, and the cumulative effects, it is NOAA Fisheries' biological opinion that the proposed fishery management plan and fisheries are not likely to jeopardize the continued existence of the UCR spring chinook salmon and UCR steelhead ESUs.

7.0 INCIDENTAL TAKE STATEMENT

Section 9 of the ESA and Federal regulations pursuant to section 4(d) of the ESA prohibit the take of endangered and threatened species, respectively, without special exemption. "Take" is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. "Harm" is further defined to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing behavioral patterns, including breeding, feeding, or sheltering. "Harass" is defined as intentional or negligent actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding, or sheltering. "Incidental take" is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the ESA provided that such taking is in compliance with the terms and conditions of this Incidental Take Statement (ITS).

The measures described below are non-discretionary; they must be undertaken by the action agency so that they become binding conditions of any grant or permit issued to the applicant, as appropriate, in order for the exemption in section 7(o)(2) to apply. The action agency has a continuing duty to regulate the activity covered in this incidental take statement. If the action agency (1) fails to assume and implement the terms and conditions or (2) fails to require the applicant to adhere to the terms and conditions of the incidental take statement through enforceable terms that are added to the permit or grant document, the protective coverage of section 7(o)(2) may lapse. In order to monitor the impact of incidental take, the agency must report the progress of the action and its impact on the species to NOAA Fisheries as specified in the incidental take statement [50 CFR §402.14(I)(3)].

An incidental take statement specifies the impact of any incidental taking of endangered or threatened species. It also provides reasonable and prudent measures that are necessary to minimize impacts and sets forth terms and conditions with which the action agency must comply in order to implement the reasonable and prudent measures.

7.1 Amount or Extent of Incidental Take Anticipated

The amount of anticipated incidental take is expressed in terms of mortality rates, as a percentage of the total runsize at Wells Dam, according to the proposed abundance-based schedule described in the plan and summarized in Table 5. Allowable take is defined this way so as to be responsive to varying runsizes.

7.1.1 UCR Spring Chinook Salmon

The incidental impacts on listed UCR spring chinook salmon are expected to be very low. Based on the available information, the incidental take of UCR spring chinook will result in harvest rates between 0% and 0.1% of the ESU runsize on any given year.

7.1.2 UCR Steelhead

The allowable mortality rates on hatchery-origin (marked) UCR steelhead will vary between 3% and 50%, depending on the total steelhead count over Wells Dam on any given year, according to the proposed abundance-based schedule (Table 5).

The allowable mortality rates on natural-origin (unmarked) UCR steelhead will vary between 1% and 10%, depending on the total steelhead count over Wells Dam on any given year, according to the proposed abundance-based schedule (Table 5).

7.2 Effect of the Take

In this biological opinion, NOAA Fisheries has determined that the level of take anticipated is not likely to jeopardize the continued existence of listed UCR spring chinook salmon or UCR steelhead.

7.3 Reasonable and Prudent Measures

NOAA Fisheries concludes that the following reasonable and prudent measures (RPMs) are necessary and appropriate to minimize the impacts from the fisheries considered in this opinion to listed salmon and steelhead ESUs.

1. The CCT shall conduct yearly fisheries according to the provisions of the fishery management plan.

2. The CCT shall monitor the fishery in cooperation with other pertinent monitoring efforts, such as obtaining daily dam counts at McNary, Priest Rapids, Rock Island, Rocky Reach and Wells Dams. The CCT will also use the inseason runsize updates provided by WDFW.

3. The CCT shall account for the mortality rate associated with each year's fishery as it occurs through the duration of this opinion.

4. The CCT shall report to the BIA and NOAA Fisheries the results of monitoring activities and, in particular, any increases in the incidental mortality rates of listed species from those allowed through this consultation.

5. The CCT shall write a fishery report each year for the duration of this opinion.

7.4 Terms and Conditions

In order to be exempt from the prohibitions of section 9 of the ESA, the BIA/CCT must comply with the following terms and conditions, which implement the reasonable and prudent measures described above. These terms and conditions are non-discretionary.

1. To implement RPM # 1, the BIA through the CCT shall manage the fishery according to the provisions of the fishery management plan.

2. To implement RPM # 2, the BIA through the CCT shall obtain daily counts for all UCR spring chinook salmon and UCR steelhead passing McNary, Priest Rapids, Rock Island, Rocky Reach and Wells Dams. The CCT will also use WDFW's inseason runsize updates to calculate incidental impacts on UCR steelhead allowable based on Table 5.

3. To implement RPM # 3, the BIA through the CCT shall monitor the catch in each year's fishery with sufficient detail to provide statistically valid estimates of UCR spring chinook salmon and UCR steelhead catch and drop off rate. Sampling of the catch shall entail daily contact with fishers regarding that day's catch.

4. To implement RPM # 4, the BIA through the CCT shall account for the catch of each year's fishery as it occurs (i.e., in real-time) throughout the duration of the time period considered in this opinion. If it becomes apparent inseason that any of the established take limits may be exceeded for either UCR spring chinook salmon or UCR steelhead, then the CCT shall take additional management measures to reduce the catch as needed to conform to the limits, including potentially stopping the fishery in any given year.

5. The CCT shall provide an annual report to the Fisheries Management Branch, NOAA Fisheries, documenting the incidental take of ESA-listed species associated with the Chief Joseph tailrace fishery by January 31 of each year for the duration of this opinion.

8.0 CONSERVATION RECOMMENDATIONS

Conservation recommendations are discretionary measures suggested to minimize or avoid adverse effects of a proposed action on ESA-listed species or critical habitat, to develop additional information, or to assist Federal agencies in complying with their obligations under section 7(a)(1) of the ESA. NOAA Fisheries does not have any conservation recommendations associated with this action at this time.

9.0 REINITIATION OF CONSULTATION

This concludes formal consultation on the proposed 2002-2012 CCT management plan for a fishery in the tailrace of Chief Joseph Dam in the Columbia River Basin. As provided in 50 CFR §402.16, reinitiation of formal consultation is required where discretionary federal agency involvement or control over the action has been retained (or is authorized by law) and if: (1) the amount or extent of incidental take is exceeded; (2) new information reveals effects of the action that may affect listed species or critical habitat in a manner or to an extent not previously considered; (3) the identified action is subsequently modified in a manner that causes an effect to listed species or critical habitat that was not considered in the biological opinion; (4) a new species is listed or critical habitat designated that may be affected by the identified action. In instances where the amount or extent of incidental take is exceeded, any operations causing such take must cease pending reinitiation.

NOAA Fisheries finds the management constraints contained in this opinion necessary for the conservation of the affected listed species. In arriving at these management constraints, NOAA Fisheries has been mindful of affected treaty rights and its Federal trust obligations. NOAA Fisheries will reconsider the management constraints in this opinion that affect treaty rights in the event new information indicates such reconsideration is warranted.

10.0 MAGNUSON-STEVENS ACT ESSENTIAL FISH HABITAT CONSULTATION

The Magnuson-Stevens Fishery Conservation and Management Act (MSA), as amended by the Sustainable Fisheries Act of 1996 (Public Law 104-267), established procedures designed to identify, conserve, and enhance Essential Fish Habitat (EFH) for those species regulated under a Federal fisheries management plan. Pursuant to the MSA:

- Federal agencies must consult with NOAA Fisheries on all actions, or proposed actions, authorized, funded, or undertaken by the agency, that may adversely affect EFH (§305(b)(2));

- NOAA Fisheries must provide conservation recommendations for any Federal or State action that would adversely affect EFH (§305(b)(4)(A));
- Federal agencies must provide a detailed response in writing to NOAA Fisheries within 30 days after receiving EFH conservation recommendations. The response must include a description of measures proposed by the agency for avoiding, mitigating, or offsetting the impact of the activity on EFH. In the case of a response that is inconsistent with NOAA Fisheries EFH conservation recommendations, the Federal agency must explain its reasons for not following the recommendations (§305(b)(4)(B)).

EFH means those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity (MSA §3). For the purpose of interpreting this definition of EFH: Waters include aquatic areas and their associated physical, chemical, and biological properties that are used by fish and may include aquatic areas historically used by fish where appropriate; substrate includes sediment, hard bottom, structures underlying the waters, and associated biological communities; necessary means the habitat required to support a sustainable fishery and the managed species' contribution to a healthy ecosystem; and "spawning, breeding, feeding, or growth to maturity" covers a species' full life cycle (50 CFR 600.10). Adverse effect means any impact which reduces quality and/or quantity of EFH, and may include direct (*e.g.*, contamination or physical disruption), indirect (*e.g.*, loss of prey or reduction in species fecundity), site-specific or habitat-wide impacts, including individual, cumulative, or synergistic consequences of actions (50 CFR 600.810).

EFH consultation with NOAA Fisheries is required regarding any Federal agency action that may adversely affect EFH, including actions that occur outside EFH, such as certain upstream and upslope activities.

The objectives of this EFH consultation are to determine whether the proposed action would adversely affect designated EFH and to recommend conservation measures to avoid, minimize, or otherwise offset potential adverse effects to EFH.

10.1 Identification of Essential Fish Habitat

Pursuant to the MSA, the Pacific Fisheries Management Council (PFMC) has designated EFH for three species of federally-managed Pacific salmon: chinook (*Oncorhynchus tshawytscha*); coho (*O. kisutch*); and Puget Sound pink salmon (*O. gorbuscha*) (PFMC 1999). Freshwater EFH for Pacific salmon includes all those streams, lakes, ponds, wetlands, and other water bodies currently, or historically accessible to salmon in Washington, Oregon, Idaho, and California, except areas upstream of certain impassable man-made barriers (as identified by the PFMC 1999), and longstanding, naturally-impassable barriers (i.e., natural waterfalls in existence for several hundred years). Detailed descriptions and identifications of EFH for salmon are found in Appendix A to Amendment 14 to the Pacific Coast Salmon Plan (PFMC 1999). Assessment of potential adverse effects to these species' EFH from the proposed action is based, in part, on this information.

10.2 Proposed Action and Action Area

For this EFH consultation, the proposed actions and action area are as described in detail above (section 1.0 of the biological opinion). The action is the issuance of an incidental take statement pursuant to section 7 of the ESA. The proposed action area is the Chief Joseph Dam tail race fishery and is part of EFH designated for various life stages of chinook salmon.

10.3 Effects of the Proposed Action

Based on information submitted by the BIA, as well as NOAA Fisheries' analysis in the ESA consultation above, NOAA Fisheries believes that the effects of this action on UCR chinook habitat are likely to be within the range of effects considered in the ESA portion of this consultation. Effects of the proposed action would be limited to interference with migratory passage of a very small proportion of the UCR chinook salmon return due to fishery timing and run timing.

10.4 Conclusion

Using the best scientific information available and based on its ESA consultation above, as well as the foregoing EFH sections, NOAA Fisheries has determined that the proposed action is not likely to adversely affect UCR chinook habitat.

10.5 EFH Conservation Recommendation

Because this action has been determined not likely to adversely affect EFH for Pacific salmon, no conservation recommendations have been developed, and no statutory response is required.

10.6 EFH Consultation Renewal

The action agencies must reinitiate EFH consultation if plans for these actions are substantially revised in a way that may adversely affect EFH, or if new information becomes available that affects the basis for the EFH conservation recommendations (50 CFR § 600.920(k).

11.0 References

BAMP (Biological Assessment and Management Plan). 1998. Mid-Columbia River Hatchery Program. National Marine Fisheries Service, U.S. Fish and Wildlife Service, Washington Department of Fish and Wildlife, Confederated Tribes of the Yakama Indian Nation, Confederated Tribes of the Colville Indian Reservation, and the Confederated Tribes of the Umatilla Indian Reservation. Mid-Columbia Mainstem Conservation Plan. 135p.

Barnhart, R.A. 1986. Species profiles: Life histories and environmental requirements of coastal fishes and invertebrates (Pacific Southwest)--steelhead. U.S. Fish and Wildl. Serv. Biol. Rep. 82(11.60). 21p.

Burgner, R.L., J.T. Light, L. Margolis, T. Okazaki, A. Tautz, and S. Ito. 1992. Distribution and origins of steelhead trout (*Oncorhynchus mykiss*) in offshore waters of the North Pacific Ocean. Int. North Pac. Fish Comm. Bull. 51. 92p. *In* Busby *et al*. (1996).

Busby, P.J., T.C. Wainwright, G.J. Bryant, L.J. Lierheimer, R.S. Waples, F.W. Waknitz, and I.V. Lagomarsino. 1996. Status review of west coast steelhead from Washington, Idaho, Oregon, and California. U.S. Dept. Commer., NOAA Tech. Memo. NMFS-NWFSC-27. 261p.

Chapman, D.W., C. Peven, A. Giorgi, T. Hillman, and F. Utter. 1995. Status of spring chinook salmon in the Mid-Columbia River. Don Chapman Consultants, Inc. Boise, ID. 477p.

Collis, K., S. Adamany, D. D. Roby, D. P. Craig, and D. E. Lyons. 1999. Avian predation on juvenile salmonids in the lower Columbia River. Report to Bonneville Power Administration and U.S. Army Corps of Engineers. Columbia River Inter-Tribal Fish Commission, Portland, Oregon, and Oregon Cooperative Fish and Wildlife Research Unit, Oregon State University, Corvallis. October 1999.

CBFWA (Columbia Basin Fish and Wildlife Authority). 1990.

Cooney, T.D. 2000. UCR steelhead and spring chinook salmon quantitative analysis report. Part 1: run reconstructions and preliminary assessment of extinction risk. National Marine Fisheries Service, Hydro Program, Technical Review Draft, Portland, Oregon. August 15, 2000.

Craig, J.A., and R.L. Hacker. 1940. The history and development of the fisheries of the Columbia River. Bulletin of the Bureau of Fisheries Vol. XLIX. Bulletin No. 32.

Darm, D. 2001. 7(d) letter to William E. Nicholson; U.S. Department of Interior, Bureau of Indian Affairs. June 29, 2001.

Doppelt, B., M. Scurlock, C. Frissell, and J. Karr. 1993. Entering the watershed: a new approach to save America's river ecosystems. Island Press, Washington D.C.

Drucker, P. 1965. Cultures of the North Pacific Coast. Chandler Publishing Company. San Francisco, California.

Federal Caucus. 2000. Conservation of Columbia River Fish: Final Basinwide Salmon Recovery strategy. December 2000. *http://www.salmonrecovery.gov*

Fish Passage Center (FPC). 2001. Adult salmon passage counts. Fish Passage Center internet website: *http://www.fpc.org/adult_history/adultsites.html* (accessed July 20, 2001).

Flagg, T. A., F. W. Waknitz, D. J. Maynard, G. B. Milner, and C.V.W. Mahnken. 1995. The effect of hatcheries on native coho salmon populations in the lower Columbia River. *In* Uses and effects of cultured fishes in aquatic systems. Transactions of the American Fisheries Society 15:366-375.

Frissell, C. A. 1993. A new strategy for watershed restoration and recovery of Pacific salmon in the Pacific Northwest. Prepared for the Pacific Rivers Council, Eugene, Oregon.

Fish, F. F., and M .G. Hanavan. 1948. A report on the Grand Coulee Fish Maintenance Project 1939-1947. U.S. Fish and Wildlife Service Special Scientific Report 55.

Ford, M., and 12 authors. 2001. Upper Columbia River steelhead and spring chinook salmon population structure and biological requirements. Final report prepared by the Upper Columba River Steelhead and Spring Chinook Salmon Biological Requirements Committee. March, 2001. Northwest Fisheries Science Center, NOAA Fisheries, Seattle, WA., 64p.

Henjum, M. G., J. R. Karr, D. L. Bottom, D. A. Perry, J. C. Bednarz, S. G. Wright, S. A. Beckwitt, and E. Beckwitt. 1994. Interim Protection for late-successional forests, fisheries, and watersheds: national forests east of the Cascade Crest, Oregon and Washington. The Wildlife Society, Bethesda, Maryland.

Independent Science Group (ISG). 1996. Return to the River: Restoration of salmonid fishes in the Columbia River ecosystem. Northwest Power Planning Council, Portland, Oregon. Publication No. 96-6. 584 pp.

Lohn, B. 2002. Letter to F. L. Cassidy, Jr., chairman, Northwest Power Planning Council. April 4, 2002. 2p. w/ enclosure.

Lower Columbia River Estuary Program. 1999. Comprehensive Conservation and Management Plan. Volume 1: June 1999. Lower Columbia River Estuary Program, Portland, Oregon.

Mantua, N.J., S.R. Hare, Y. Zhang, J.M. Wallace and R.C. Francis. 1997. A Pacific interdecadal climate oscillation with impacts on salmon production. Bull. Am. Meteorol. Soc. 78: 1069-1079.

McClure, M.B., B. Sanderson, E. Holmes, C. Jordan, P. Karieva, and P. Levin. 2000a. A standardized quantitative analysis of risks faced by salmonids in the Columbia River Basin. National Marine Fisheries Service, Northwest Fisheries Science Center, Cumulative Risk Initiative. Draft document; July 17, 2000. Seattle, Washington.

McClure, M.B., B. Sanderson, E. Holmes, C. Jordan, P. Karieva, and P. Levin. 2000b. Revised Appendix B for a standardized quantitative analysis of risks faced by salmonids in the Columbia River Basin. National Marine Fisheries Service, Northwest Fisheries Science Center, Cumulative Risk Initiative. Draft document; September. Seattle, Washington.

McElhany, P., M. Ruckelshaus, M.J. Ford, T. Wainwright, and E. Bjorkstedt. 2000. Viable Salmonid Populations and the recovery of Evolutionarily Significant Units. Draft report dated January 6, 2000. National Marine Fisheries Service, Northwest Fisheries Science Center, Cumulative Risk Initiative, Seattle, Washington. 125p.

Mullan, J.W., A. Rockhold, and C.R. Chrisman. 1992a. Life histories and precocity of chinook salmon in the mid-Columbia River. Prog. Fish-Cult. 54:25-28.

Mullan, J.W., K.R. Williams, G. Rhodus, T.W. Hillman, and J.D. McIntyre. 1992b. Production and habitat of salmonids in mid-Columbia River tributary streams. U.S. Fish and Wildlife Service Monograph I. 489p.

Myers, J.M., and 10 co-authors. 1998. Status review of chinook salmon from Washington, Idaho, Oregon, and California. U.S. Dept. of Commerce, NOAA Tech Memo. NMFS-NWFSC-35. 443pp.

NMFS (National Marine Fisheries Service). 1991. Factors for decline: A supplement to the notice of determination for Snake River spring/summer chinook salmon under the Endangered Species Act. NOAA Fisheries, Protected Resources Division, Portland, Oregon.

NMFS. 1996. Biological opinion re Impacts on listed Snake River salmon by fisheries conducted pursuant to the 1996-1998 management agreement for upper Columbia River fall chinook. July 31, 1998. 20p.

NMFS. 1998. Status Review Update for West Coast Chinook Salmon (*Oncorhynchus tshawytscha*) from Puget Sound, Lower Columbia River, Upper Willamette River, and Upper Columbia River Spring-run ESUs. December 23, 1998.

NMFS. 1999a. Evaluation of the status of chinook and chum salmon and steelhead hatchery populations for ESUs identified in final listing determinations. Memorandum from M. Schiewe thru U. Varanasi to W. Stelle, dated March 4, 1999.

NMFS. 1999b. The Habitat Approach: Implementation of Section 7 of the Endangered Species Act for Actions Affecting the Habitat of Pacific Anadromous Salmonids. NOAA Fisheries, Northwest Region, Habitat Conservation and Protected Resources Divisions. August 26, 1999.

NMFS. 2000. Endangered Species Act section 7 Biological Opinion on the reinitiation of consultation on operation of the federal Columbia River Power System, including juvenile fish transportation programs, and 19 Bureau of Reclamations projects in the Columbia Basin. December 2000.

NMFS. 2001a. Biological Opinion. Impacts of the Interim Management Agreement for upriver spring chinook, summer chinook, and sockeye salmon and steelhead listed under the Endangered Species Act. March 21, 2001. 97p. Available at: *http://www.nwr.noaa.gov/1sustfsh/biops.htm*

NMFS. 2001b. Impacts of Treaty Indian and non-Indian fall season fisheries in the Columbia River Basin in year 2001 on salmon and steelhead listed under the Endangered Species Act. August 10, 2001. NOAA Fisheries, Portland, Oregon.

NOAA Fisheries. 2002. Biological Opinion. Impacts of treaty Indian and Non-Indian Fall Season in the Columbia River Basin in Year 2002 on Salmon and Steelhead Listed Under the Endangered Species Act. August 15, 2002. 88p. Available at: *http://www.nwr.noaa.gov/1sustfsh/biops.htm*

NRC (National Research Council). 1996. *Upstream*: Salmon and Society in the Pacific Northwest. National Academy Press, Washington, D.C. 452p.

Northwest Fisheries Science Center (NWFSC). 2000. A standardized quantitative analysis of risks faced by salmonids in the Columbia River Basin. April 7, 2000. 127p w/appendices. (*http://www.nwfsc.noaa.gov/cri/*)

Nicholson, W.E. 2001. A Summary and evaluation of the Colville Confederated Tribes Current tribal Fishing Regulations for Summer/fall Chinook Salmon (Oncorhyncus tshawytscha) in the Tailrace of Chief Joseph Dam. 9p.

Nicholson, W. E. 2002a. Biological assessment for the 2002-2012 Chief Joseph dam Tailrace fishery for Colville Tribal Members and Incidental Impacts on Salmon and Steelhead Species Listed Under the Endangered Species Act. April 11, 2002.

Nicholson, W. E. 2002b. Biological assessment for the 2002-2012 Chief Joseph dam Tailrace fishery for Colville Tribal Members and Incidental Impacts on Salmon and Steelhead Species Listed Under the Endangered Species Act. May 21, 2002.

Nicholson, W. E. 2002c. Letter to W.L. Robinson, Assistant Regional Administrator of Sustainable Fisheries. NMFS. Final amendments to the biological assessment. June 28, 2002.

ODFW (Oregon Department of Fish and Wildlife) and WDFW (Washington Department of Fish and Wildlife). 1998. Status report, Columbia River fish runs and fisheries, 1938-1997. ODFW, Portland, Oregon, and WDFW, Olympia, Washington.

PFMC (Pacific Fisheries Management Council). 1999. Amendment 14 to the Pacific Coast Salmon Plan. Appendix A: Description and Identification of Essential Fish Habitat, Adverse Impacts and Recommended Conservation Measures for Salmon. Pacific Fishery Management Council, Portland, Oregon.

Quigley, T. M., and S. J. Arbelbide (eds). 1997. An assessment of ecosystem components in the interior Columbia River basin and portions of the Klamath and Great Basins: Volume 3. Gen. Tech. Rep. PNW-GTR-405. Portland, Oregon: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 4 vol. (Quigley T. M., tech. ed.: The Interior Columbia Basin Ecosystem Management Project: Scientific Assessment).

Ricker, W.E. 1959. Evidence for environmental and genetic influence on certain characters which distinguish stocks of the Pacific salmons and steelhead trout. Fisheries Research Board of Canada, Biological Station, Nanaimo, B.C.

Robinson, W.L. 2002. Letter to W.E. Nicholson, Bureau of Indian Affairs, regarding CCT fisheries in 2002. July 2, 2002. 4p.

Roby, D. D., D. P. Craig, K. Collis, and S. L. Adamany. 1998. Avian predation on juvenile salmonids in the lower Columbia River. Report to Bonneville Power Administration and U.S. Army Corps of Engineers. Oregon Cooperative Fish and Wildlife Research Unit, Corvallis, and Columbia River Inter-Tribal Fish Commission, Portland, Oregon. September 1998 revision.

Spence, B. C., G. A. Lomnicky, R. M. Hughes, and R. P. Novitzki. 1996. An ecosystem approach to salmonid conservation. Prepared by Management Technology for the National Marine Fisheries Service. TR-4501-96-6057. (Available from the NMFS Habitat Branch, Portland, Oregon.)

Standford, J. A., and J. V. Ward. 1992. Management of aquatic resources in large catchments: recognizing interactions between ecosystem connectivity and environmental disturbance. Pages 91-124 *in* R. J. Naiman, editor. Watershed management: balancing sustainability and environmental change. Springer-Verlag, New York.

Technical Advisory Committee (TAC). 1997. 1996 All species review - summer steelhead: Columbia River Fish Management Plan. August 4, 1997. 17p. w/ tables, tables 8-11 updated.

Thomas, D. W. 1981. Historical analysis of the Columbia River estuary: An ecological approach. Draft report to the Columbia River Estuary Study Taskforce.

Washington Department of Fisheries (WDF), Washington Department of Wildlife, and Western Washington Treaty Indian Tribes. 1993. 1992 Washington State salmon and steelhead stock inventory (SASSI). Wash. Dep. Fish Wildl., Olympia, Washington. 212p. + 5 regional volumes.

Waples, R.S., O.W. Johnson, R.P. Jones Jr. 1991. Status review for Snake River sockeye salmon. U.S. Department of Commerce, NOAA Technical Memorandum NMFS F/NWC-195. 23p.